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AUTHOR Luczcz, M. A.
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ABSTRACT

Three experiments using the same overall design were conducted to address problems associated with repeated measurement designs employed to assess retention of information in complex pictures and to assess the developmental course of schemata-guided retention efforts. Forty-eight subjects, ages 6, 10, and 20 years, were shown scenes whose forms were varied between groups--arranged naturally, in quadrants, or vertically. Scene content for the four items in each scene, either high or low probability, was varied within subjects. In experiment 1, subjects were asked to recognize target components on an immediate recognition test containing equal numbers of high and low probability targets and distractors. In experiment 2, subjects were asked to recall the target item when the three items accompanying it during acquisition were represented in their original structural form during cued recall. Experiment 3 examined free recall. Results of all three studies showed developmental improvements in recognition. The effects of form and content did not vary developmentally when memory was tested by recognition or free recall. Naturalistic forms facilitated recall but not recognition at all ages. Age and content interacted when memory was tested by cued recall. (Test items are included.) (JL)

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A Developmental Study of Recognition and Recall of Complex Pictures

Dr. M. A. Luszcz, Psychology Discipline, Flinders Univeristy,
Bedford Park, South Australia, 5042, AUSTRALIA

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Three experiments assessed the developmental course of schema-guided retention of 4-component pictures. Age (6, 10, or 20 years) and Scene Form (naturalistic, quadrant, vertical) were varied between groups; Scene Content (high vs low probability) was varied within. Experiment 1 required recognition of a designated target item from each scene. Experiment 2 required recall of a target item when cued by the rest of the scene. Experiment 3 examined free recall. Naturalistic forms facilitated recall but not recognition. Age and content interacted when memory was assessed by recognition (i.e., hits) or cued recall. In free recall the effects of form and content did not vary developmentally.

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A Developmental Study of Recognition and Recall of Complex Pictures

Three experiments were done to address problems associated with repeated measurement designs employed to assess retention of information in complex pictures (cf., Mandler & Read, 1980) and to assess the developmental course of schemata-guided retention efforts (Hock, Ronamski, Galie, & Williams, 1978; Mandler & ritchey, 1977). Several authors have suggested that schemata are used to organize memory (e.g., Friedman, 1979; Goodman, 1980; Mandler & Ritchey, 1977). However, conclusions from studies performed to date must be tentative given the difficulty in disentangling certain effects (e.g., reconstruction vs memory or memory as a product of original presentation vs further study afforded by the testing situation) when a small set of pictures is repeatedly tested. In the present research a larger pool of pictures was used and one test of each picture was made.

The overall design and acquisition procedure were the same in each experiment. Age (6, 10, or 20 years; n=48) and Scene Form (components arranged naturalistically, in quadrants, or vertically) were varied between groups; Scene Content (high probability: four components likely to occur together, vs low probability: one of four components unlikely to occur with the other three) was varied within subjects. Each scene in a continuous list of 16 (8 high and 8 low) was shown for four seconds.

A set of four-component line-drawn scenes was constructed so that each could vary in both content (Figure 1) and form (Figure 2). Content was varied by presenting four components with a high probability of occurring together (Figure 1, a & b) or substituting a

low probability component for one of the high probability components, e.g., the T.V. substituted for the seal (Figure 1d). Scene pairing permitted each of two high and two low probability components to be interchanged. Form was manipulated by presenting pictured components naturalistically (2b), one component per quadrant (2a), or four components vertically (2c). All possible versions of scene form and content were used equally often, across subjects.

In Experiment 1, subjects were required to recognize individual scene components. One item in each scene was designated the 'target' [e.g, the T.V.(seal) in Figure 1]. Equal numbers (16) of high and low probability targets and distractors were included in a yes-no recognition test immediately after study. Counterbalancing insured that distractors were equally likely to be high or low probability components with respect to acquisition scene content. Thus half the subjects viewing, for example, Figure 1b had a polar bear as distractor the remaining subjects had a T.V. or stereo distractor.

An Age by Form by Target Probabiliy by Distractor Probability ANOVA on d' showed a significant main effect of age; improvements were seen from age six (1.56) to ten (2.36) to twenty (2.92). Also significant was the interaction of target by distractor probability. Low probability distractors only slightly reduced memory strength for low probability targets (2.31) relative to high probability targets (2.41), while high probability distractors significantly reduced memory strength for high (2.04) but not low (2.36) probability targets. Note that the target-distractor interference effects did not vary with age, nor were there any effects of form.

ANOVA's were done also on the proportion of false alarms and hits.

There was a significant improvement with age in hits (.53, .68, .80) and an age by content interaction indicated no differences in hits to low vs high scenes for six (.51, .56) or ten (.68, .68) year olds but university students correctly identified more low (.83) than high (.77) probability items. There were no age or form effects in false alarms, but an interaction of content by distractor type showed a pattern consistent with the d' results.

In Experiment 2, subjects were asked to recall the target item when the three items accompanying it during acquisition were re-presented in their original structural form during cued recall (Figure 3).

An Age by Form by Content ANOVA on the proportion of high and low probability items correctly recalled indicated all main effects and the interaction of age and content to be significant. The age by content interaction showed that six (.10) and ten (.12) year olds did not differ in recall of low probability items although they recalled less than adults (.26); recall of high probability items improved significantly with each age increment (.23, .34, .53). Naturalistic forms produced better recall (.34) than either vertical (.23) or quadrant (.22) forms.

In Experiment 3 free recall was examined. To maximize cross-study comparisons, results refer to recall of items previously disignated as targets in Exp. 1 and 2. (Other recall measures showed the same pattern.) Recall improved steadily with age, naturalistic scenes produced better recall than either quadrants or vertical, and more high (.25) than low (.18) probability targets were recalled.

Conclusion. All three studies showed developmental improvements in retention. The effects of form and content did not vary developmentally when memory was tested by recognition or free recall. Naturalistic forms facilitated recall but not recognition, at all ages. Age and content interacted when memory was tested by cued recall. From Experiment 1 it seems that factors affecting memory strength as well as the nature of schemata themselves remain constant across the age-range studied. Experiments 2 and 3 corroborate these findings and also imply that developmental differences relate to use of schemata rather than their composition.

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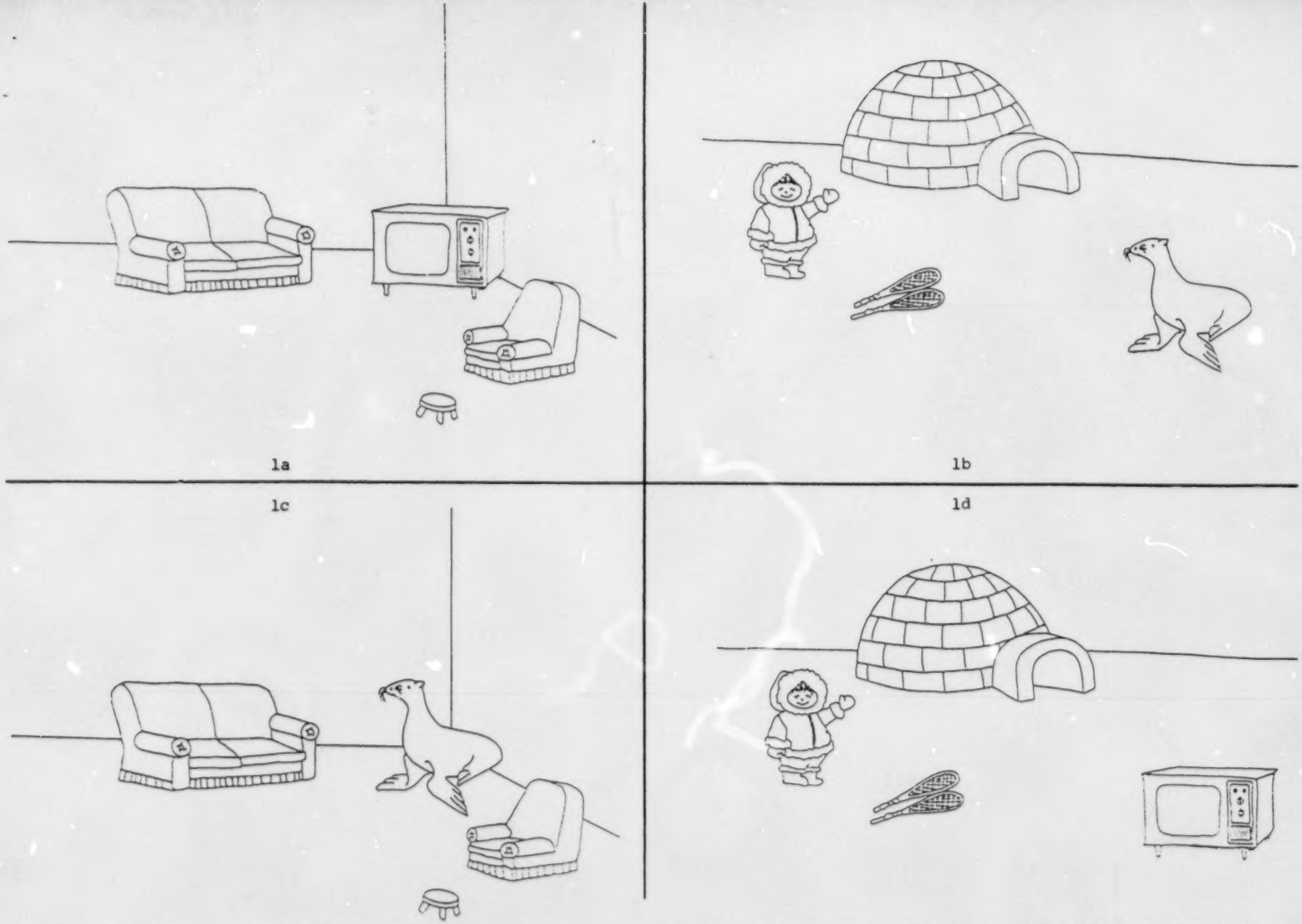

FIGURE 1. An example of paired scenes; 1a and 1b show "high probability" scenes, while 1c and 1d show "low probability".

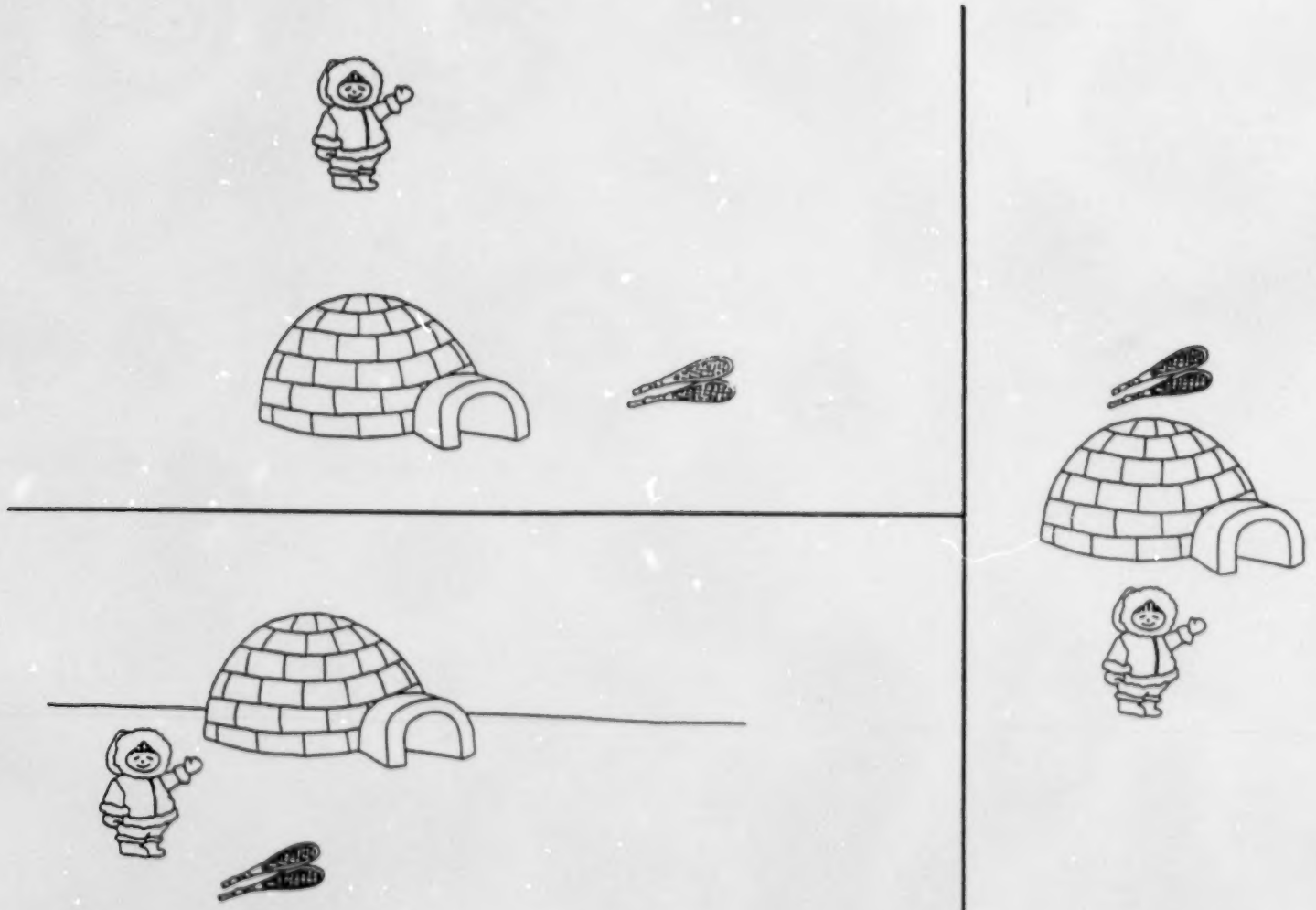

FIGURE 3. Examples of recall cues used in Experiment 2. Subjects saw the same version at study and test.

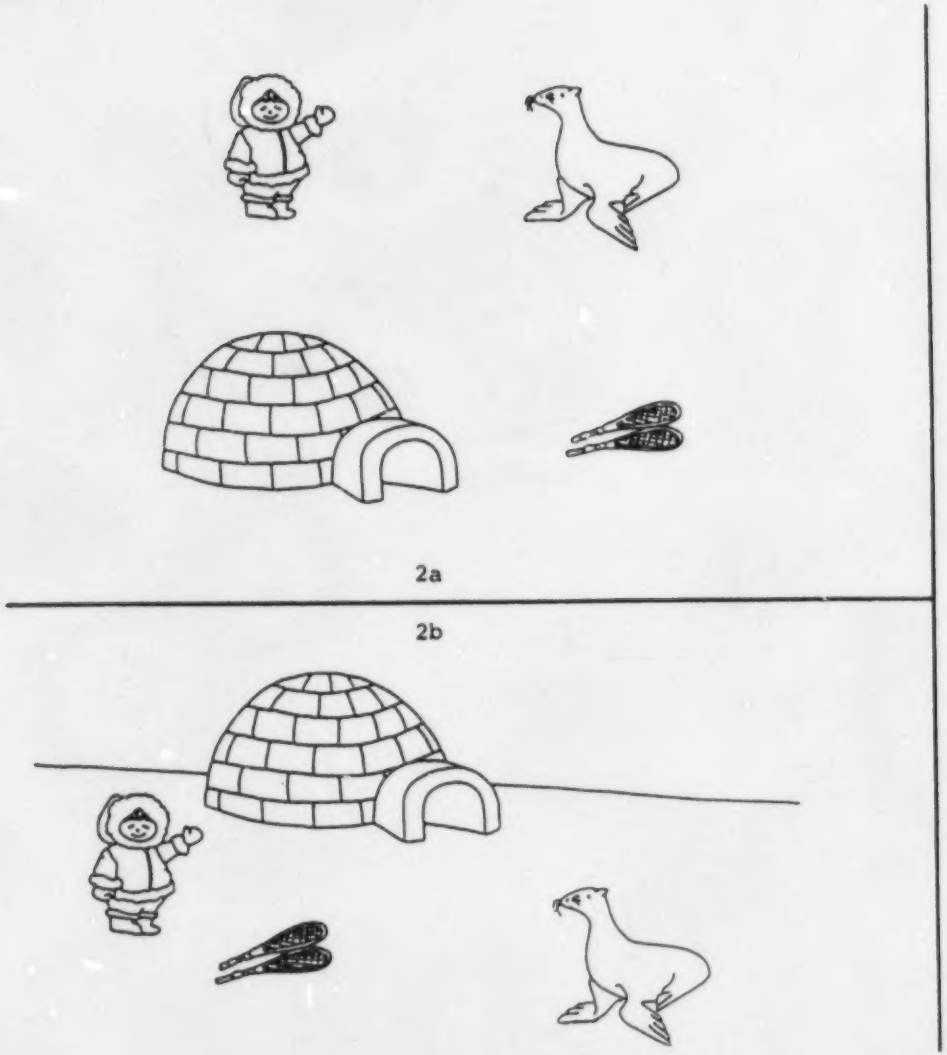

FIGURE 2. Examples of form conditions; 2a shows "quadrants", 2b shows "naturalistic", 2c shows "vertical".